

Thermodynamic Property Research of Refrigerants Over Three Decades - International Challenge and Collaboration (Invited)

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One of the most important engineering aspects of thermophysical property studies on working fluids is to provide an accurate and reliable set of essential information to the industry for their research and development of energy-efficient, cost-effective, and environmentally-friendly equipment. A typical example along this line is observed by the continuous demand from the refrigeration and air-conditioning industry regarding the thermophysical properties of refrigerants for the last three decades, since earlier conventional halogenated hydrocarbon refrigerants, CFCs, have been replaced by HCFCs, HFCs and their mixtures in accord with an increasing concern about global environmental issues.

In the present paper, the author aims to provide an overview of thermodynamic property research worldwide over the last three decades on various refrigerants starting from CFCs followed by alternative refrigerants such as HCFCs, HFCs and their mixtures, and even for several not-in-kind refrigerants including HFEs (hydrofluoroethers) and hydrocarbon refrigerants. The paper will cover some leading contributions achieved by several research institutions worldwide but an emphasis will be given to our own activities done by the group of the present author at Keio University, Yokohama.

The presentation will be completed by summarizing the long-term international collaboration of the IEA Annex-18 project on the thermophysical properties of environmentally acceptable refrigerants which has made a significant and successful contribution to the industry worldwide.